

Federal Lands Roads Working Group

CalTrans (California DOT) Merging Federal Land Data

November 10, 2020



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Project Scope

Incorporate 2018 GIS data from 5 Federal agencies into CalTrans 2019 Local LRS

- Bureau of Land Management
- Bureau of Reclamation
- National Park Service
- US Fish and Wildlife Service
- US Forest Service

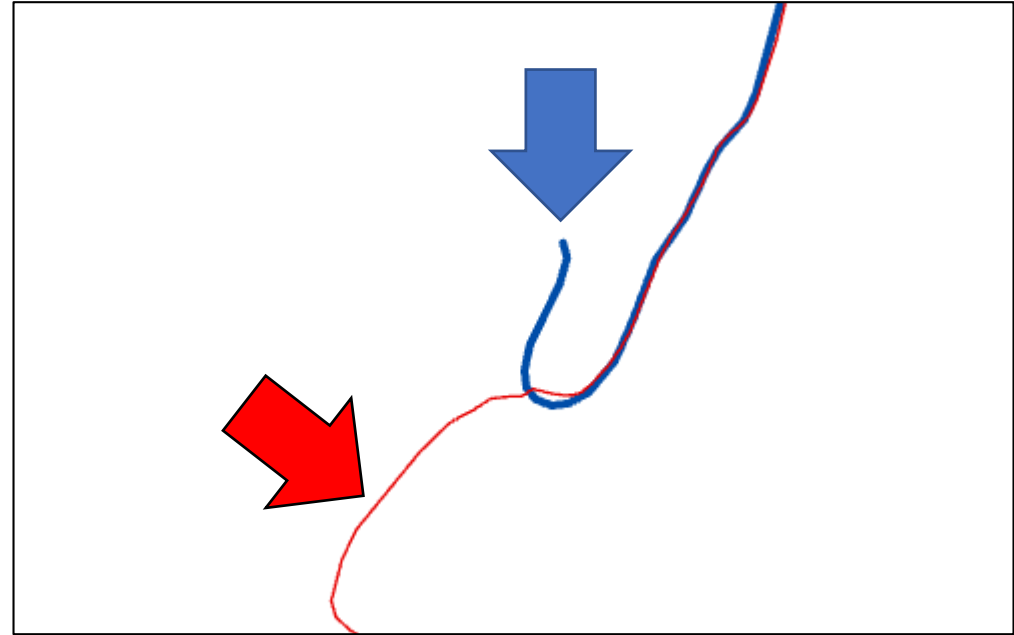
Incorporate mileages of Federally owned roads in California to the Local LRS for annual reporting to FHWA

- Software used: ArcGIS Pro 2.6

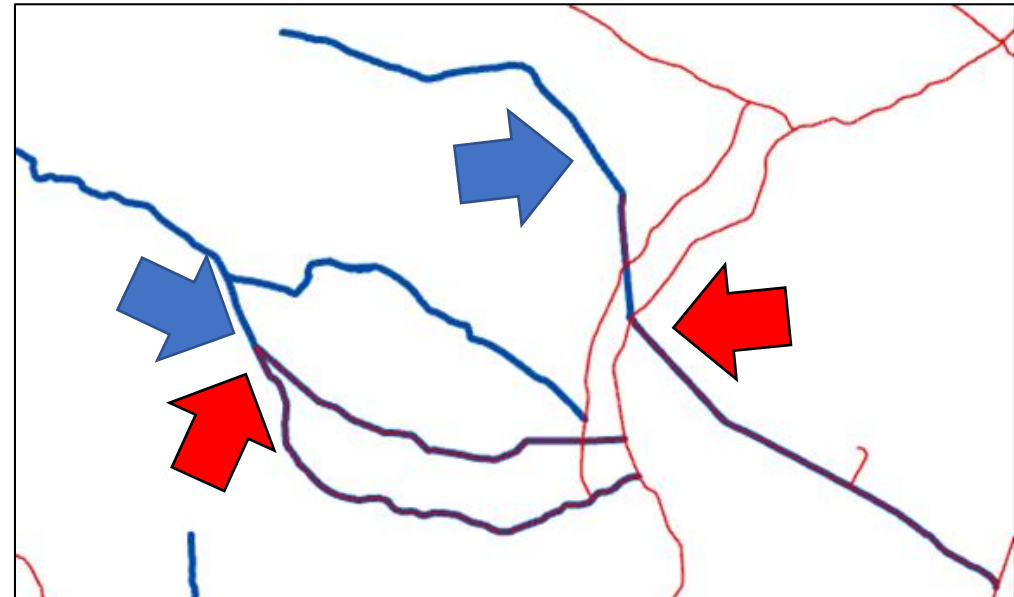


Challenges #1

The **Local LRS** extends past the end points of **Federally owned roads**

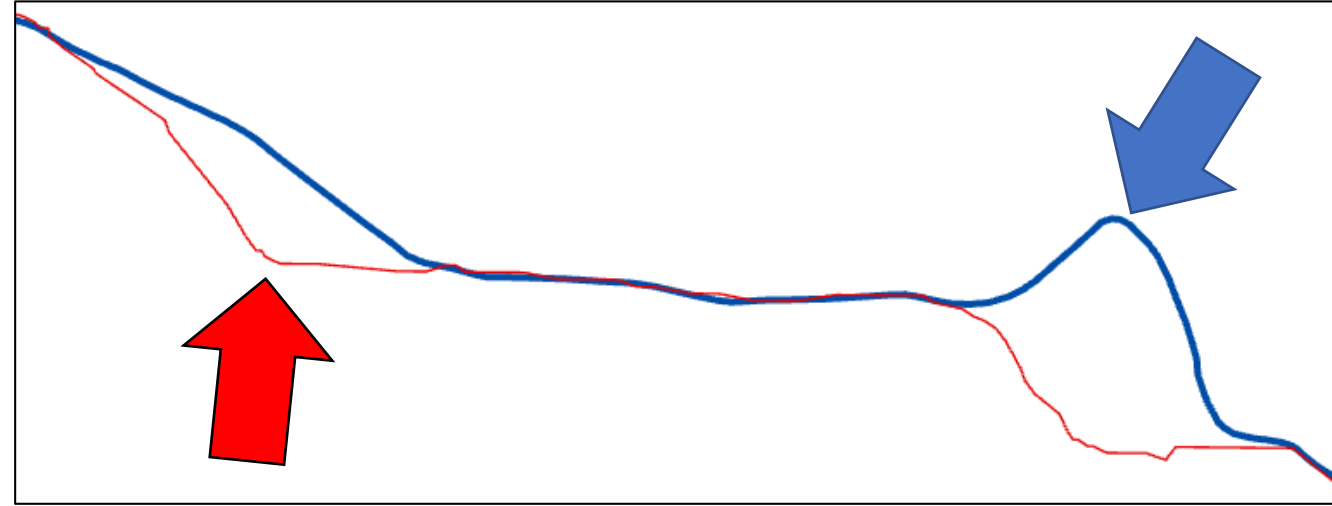


Federally owned roads extend past the end points of the **Local LRS**

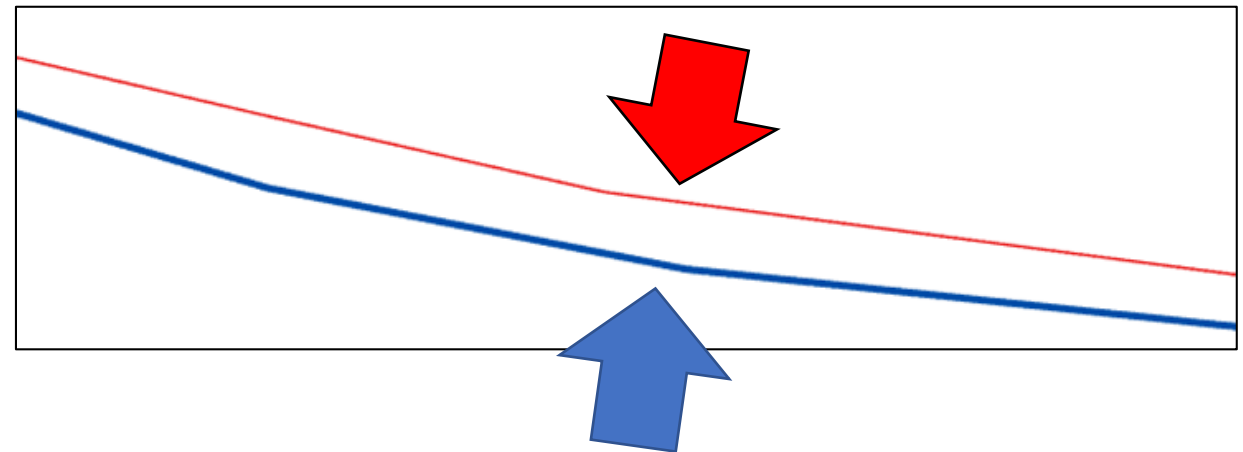


Challenges #2

Incongruent geometries between matching **Federally owned roads** and the **Local LRS**

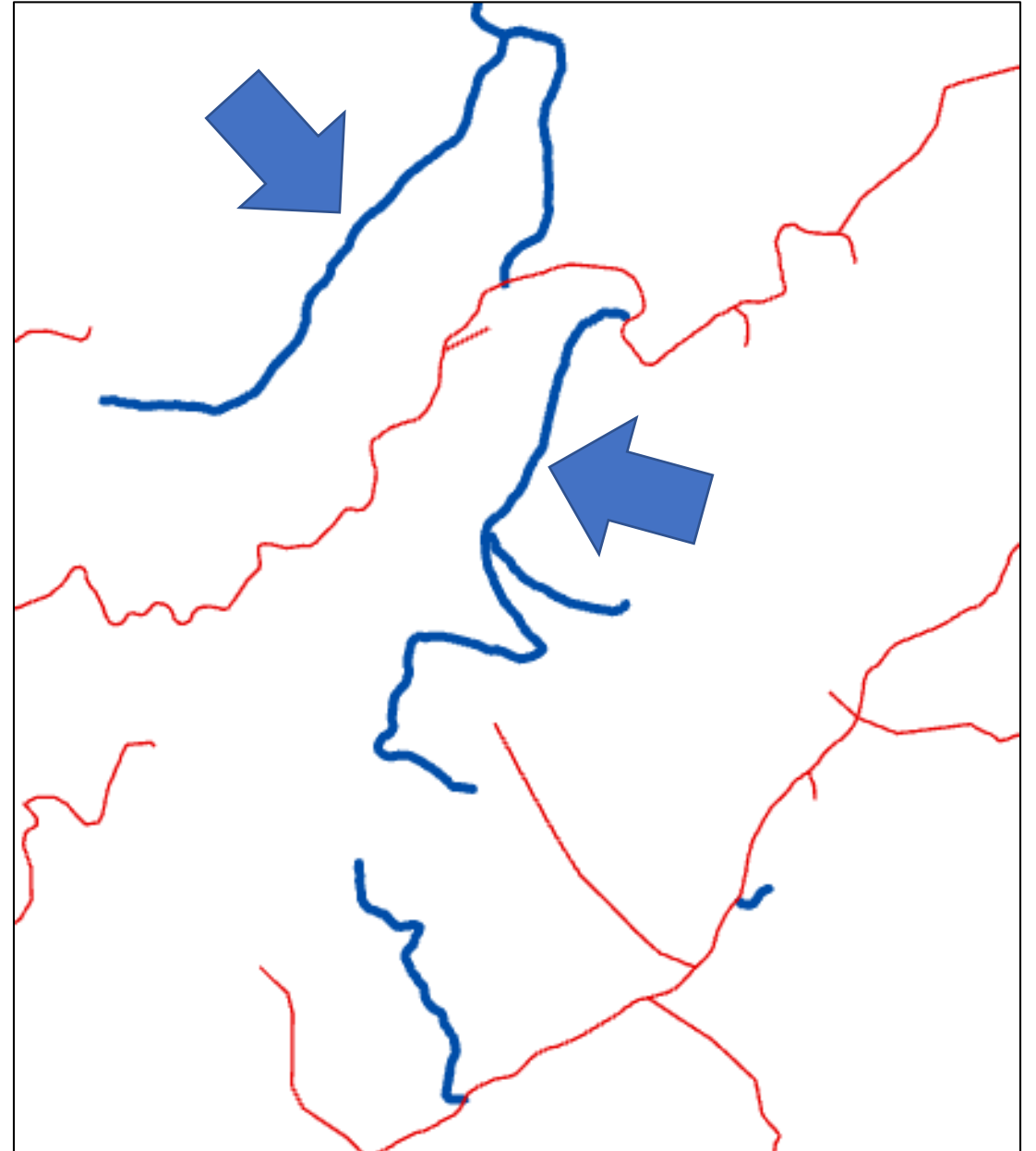


Gaps between matching **Federally owned roads** and the **Local LRS**



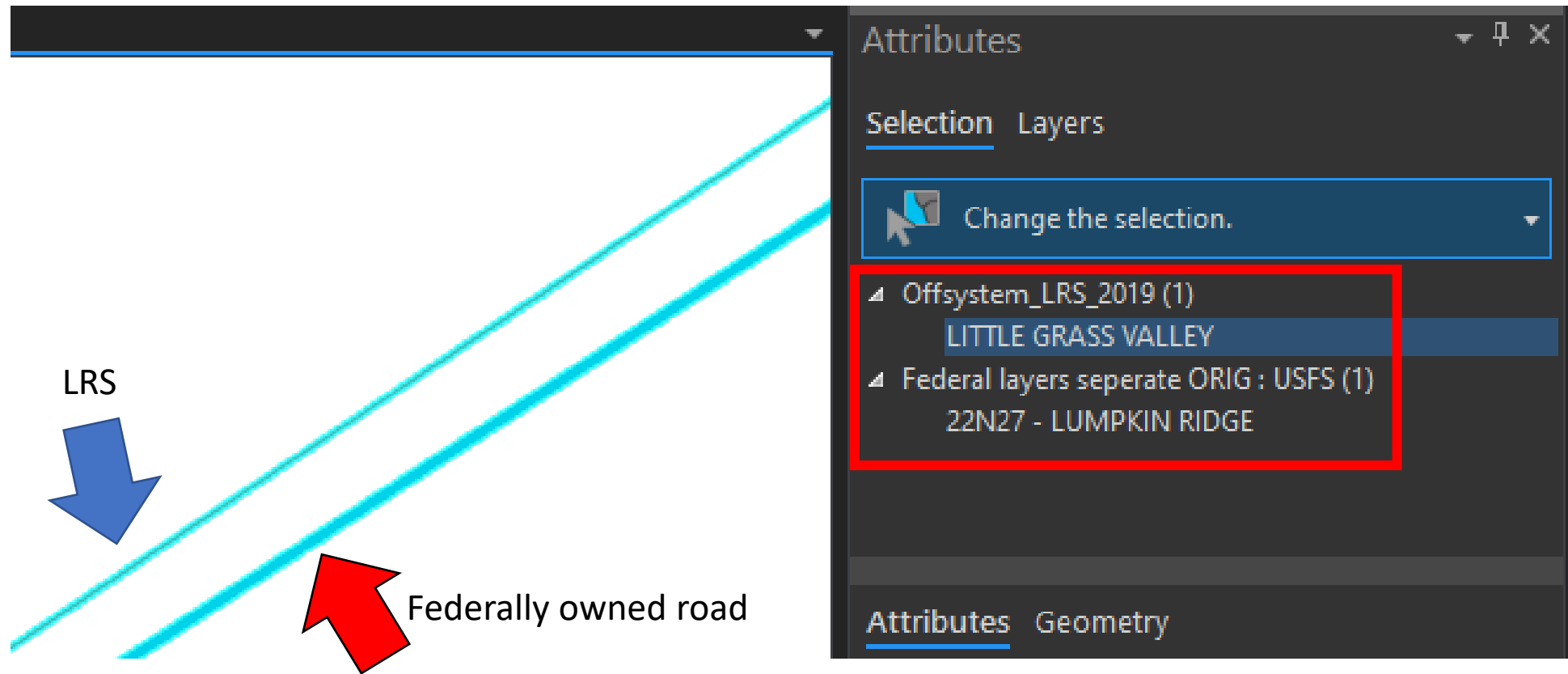
Challenge #3

Extra **Federal agency** roads that
are completely missing from the
Local LRS



Challenge #4

Visually matching Federally owned roads and Local LRS have different names



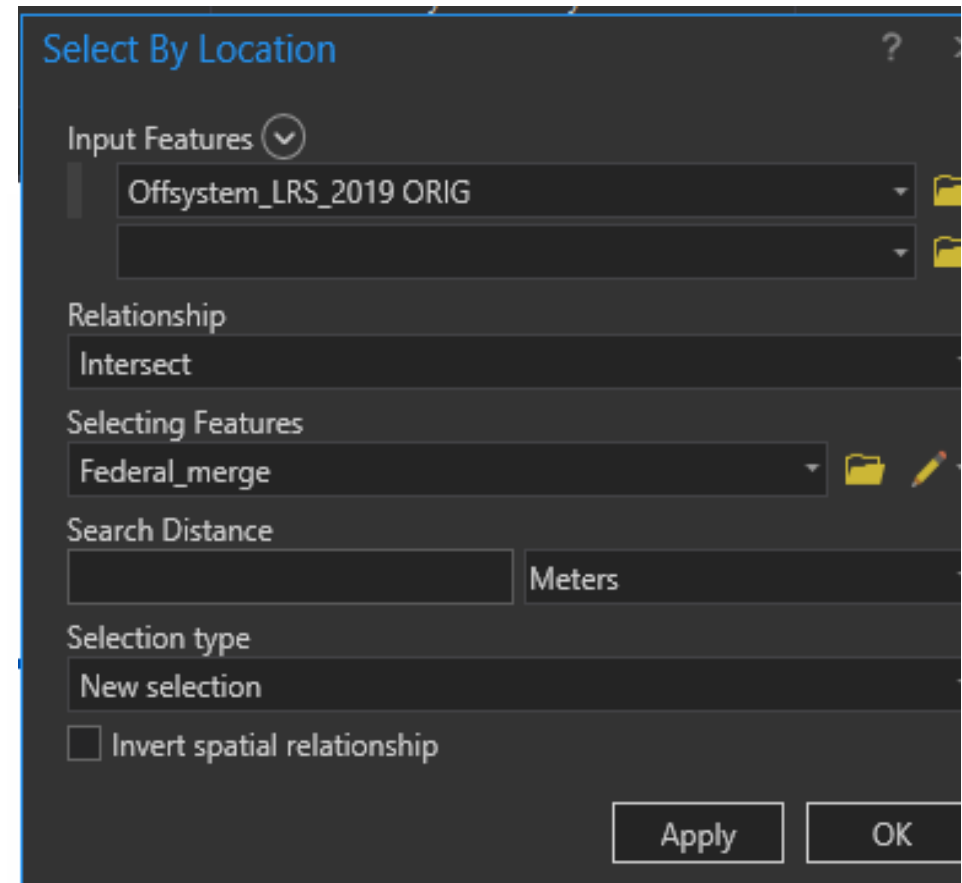
Isolate Relevant Roads from Local LRS

The complete LRS dataset is too large for the scope of this project

- Isolate only relevant roads from LRS:
 - The roads that are supposed to match with the Federally owned roads

Select By Location to identify LRS roads that Intersect Federally owned roads

- Save selection as separate layer
"Fed_Intersect_LRS"



Isolate Federally Owned Roads Missing from LRS

As identified in Challenge #3

- Later, Merge these roads into the LRS

Select By Location to identify Federally owned roads that Do NOT Intersect the LRS

- Save selection as separate layer = **"Fed_MissingFrom_LRS"**
- Selection does NOT identify all the missing roads; still need to identify missing roads that DO Intersect the LRS

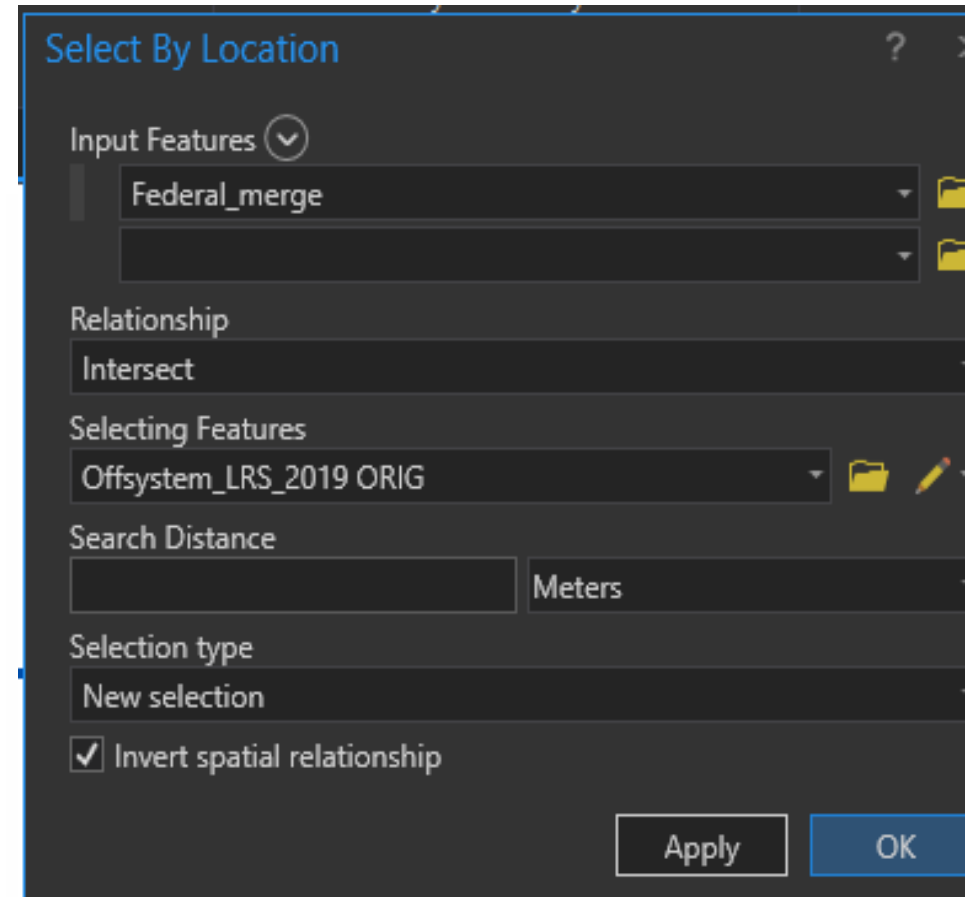
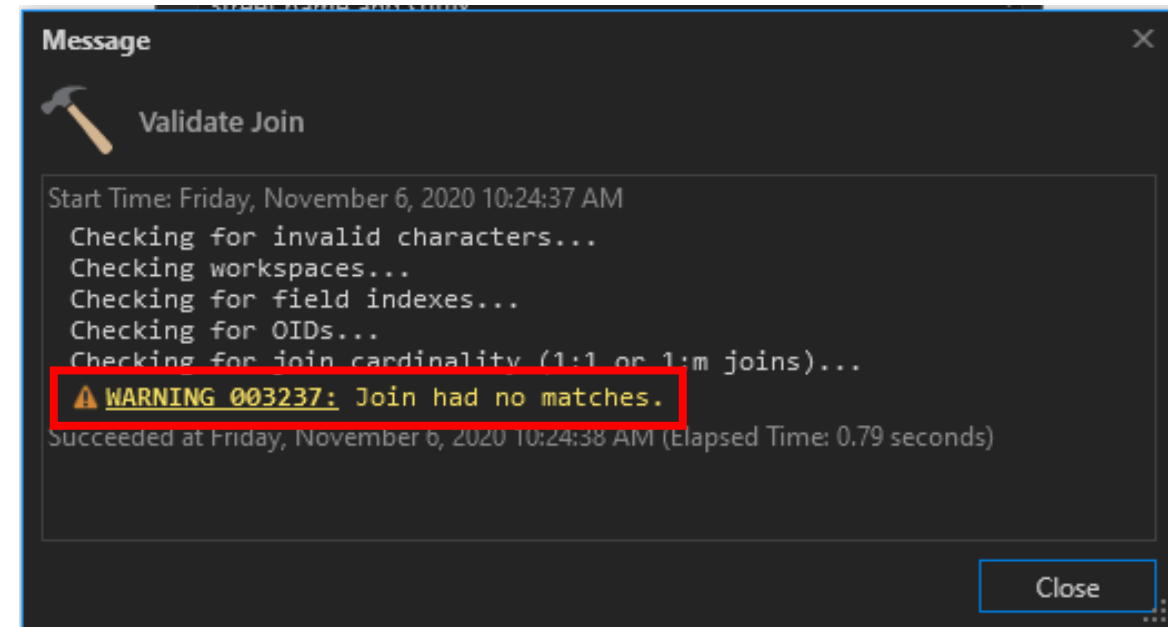
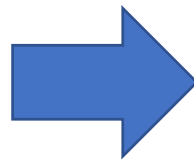
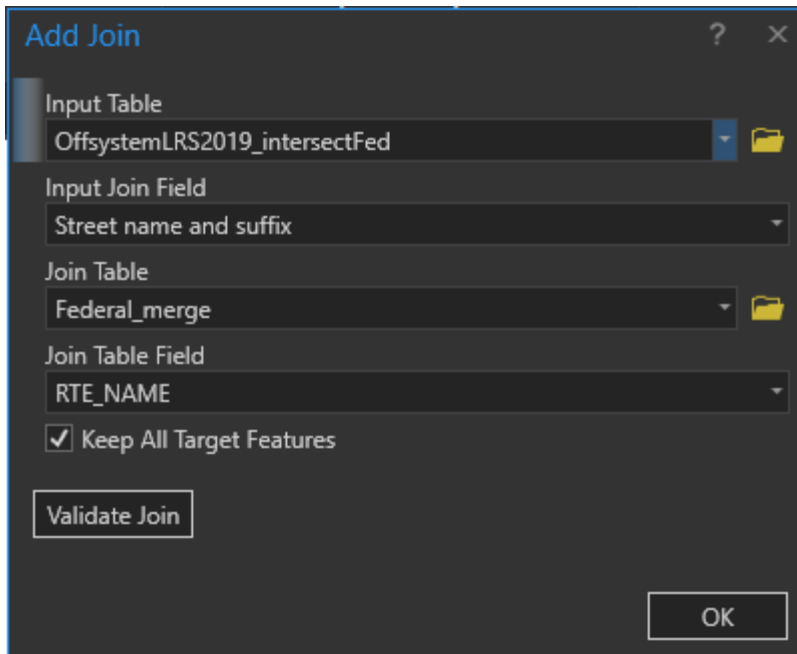


Table Join

Attempting to incorporate Federally owned roads to Local LRS via Table Join **failed**

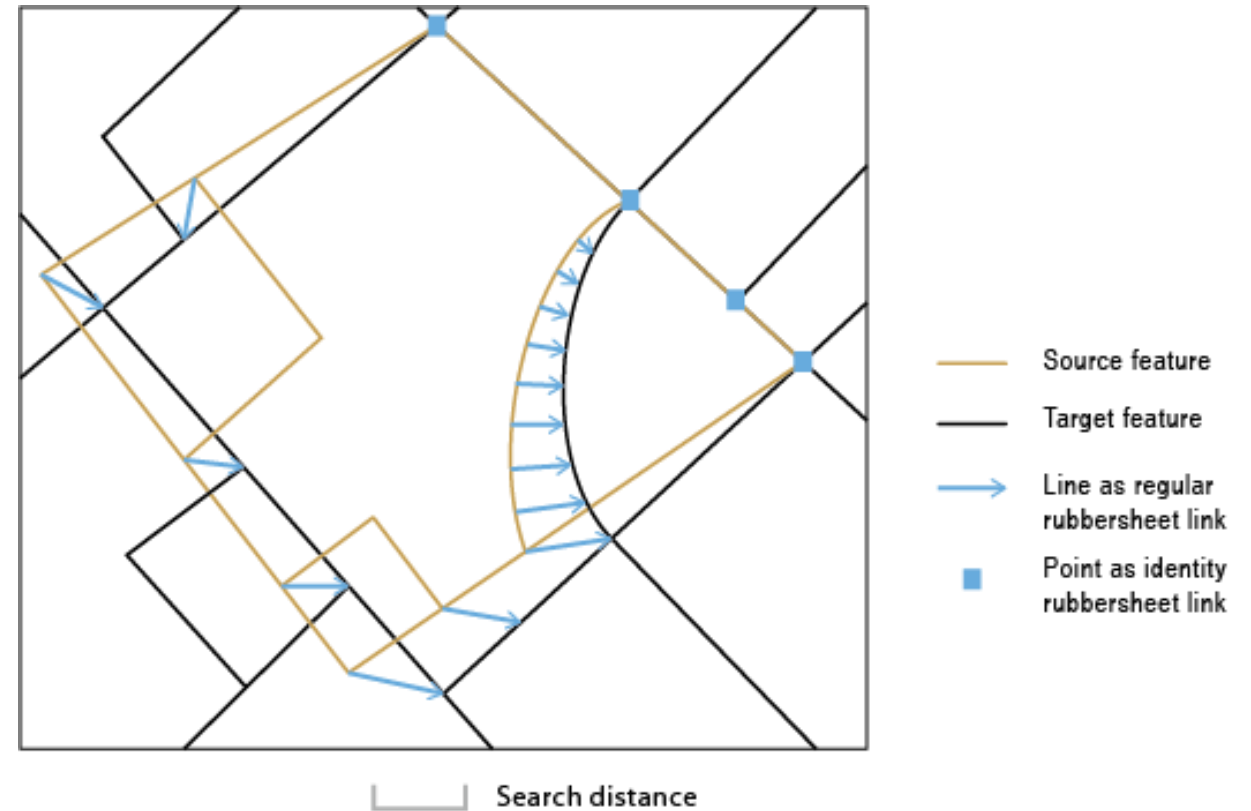
- Attempted Join Field was “route name”/“street name”
- Table Join returned 0 matches
- Too many differences in names, even between roads that are a visual match



Generate Rubbersheet Links

Use the Generate Rubbersheet Links Tool to generate lines (arrows) that indicate where **"Fed_Intersect_LRS"** needs to be edited to match the Federally owned roads

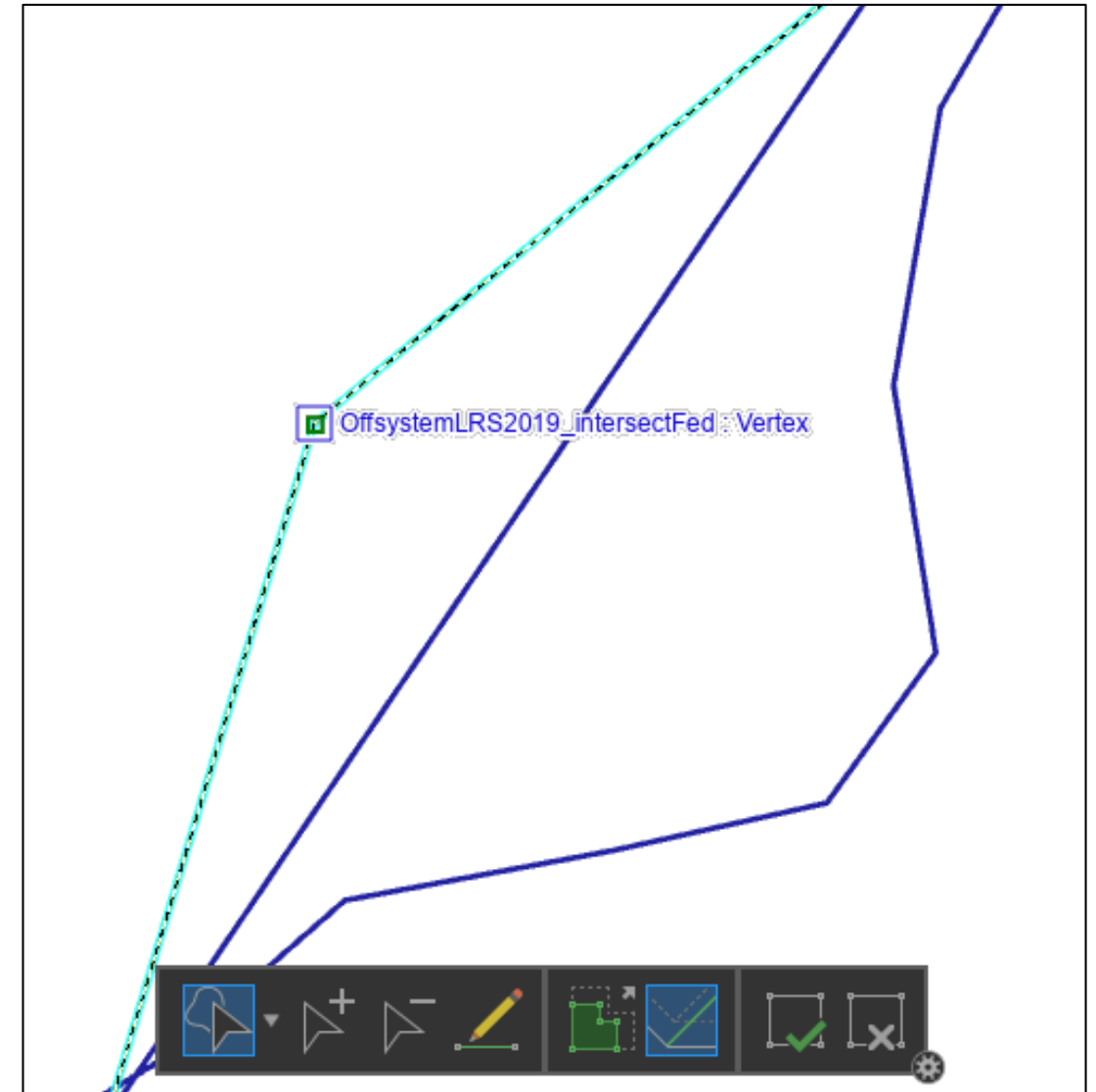
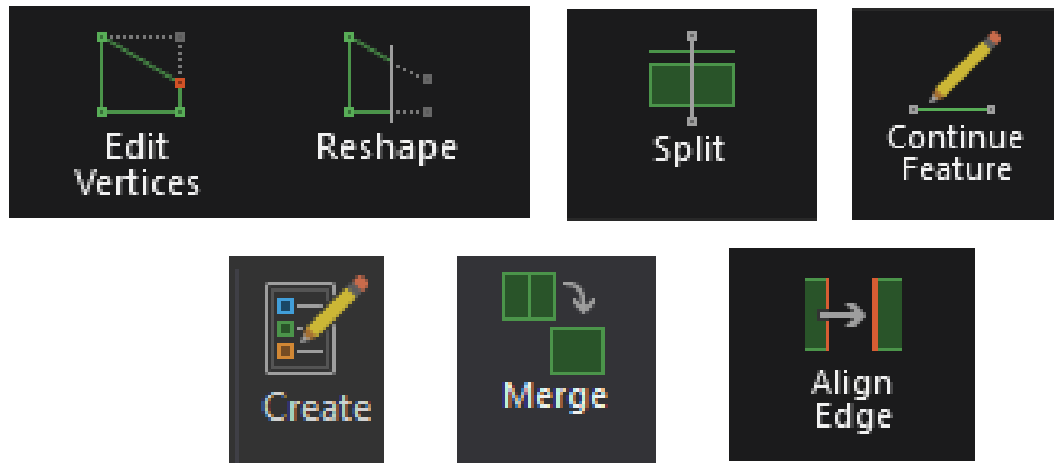
Use these arrows to determine where to make edits to the LRS



Source: [Esri](#)

Manual Editing 1 (geometry)

Assortment of Editing tools used to adjust **"Fed_Intersect_LRS"** geometry to make it match geometry of Federally owned roads



Manual Editing 2 (attributes)

Incorporate route name and Federal ownership attribute data from Federal layers to matching Local LRS roads

The screenshot shows a GIS application window with a map and an attributes panel. The map displays several road segments in cyan and magenta. A blue arrow points from a text box to a cyan road segment, and a red arrow points from the same text box to a magenta road segment. The attributes panel on the right shows a list of layers and a table of attributes for a selected feature.

Matching **Federal** and **LRS** roads...

Incorporate **Federal agency** road name and ownership attributes into **LRS road** attribute table

Attributes

Selection Layers

Change the selection.

- OffsystemLRS2019_intersectFed (1)
 - 21N51Y
- Federal layers : USFS (1)
 - 21N51Y - CROSS UP

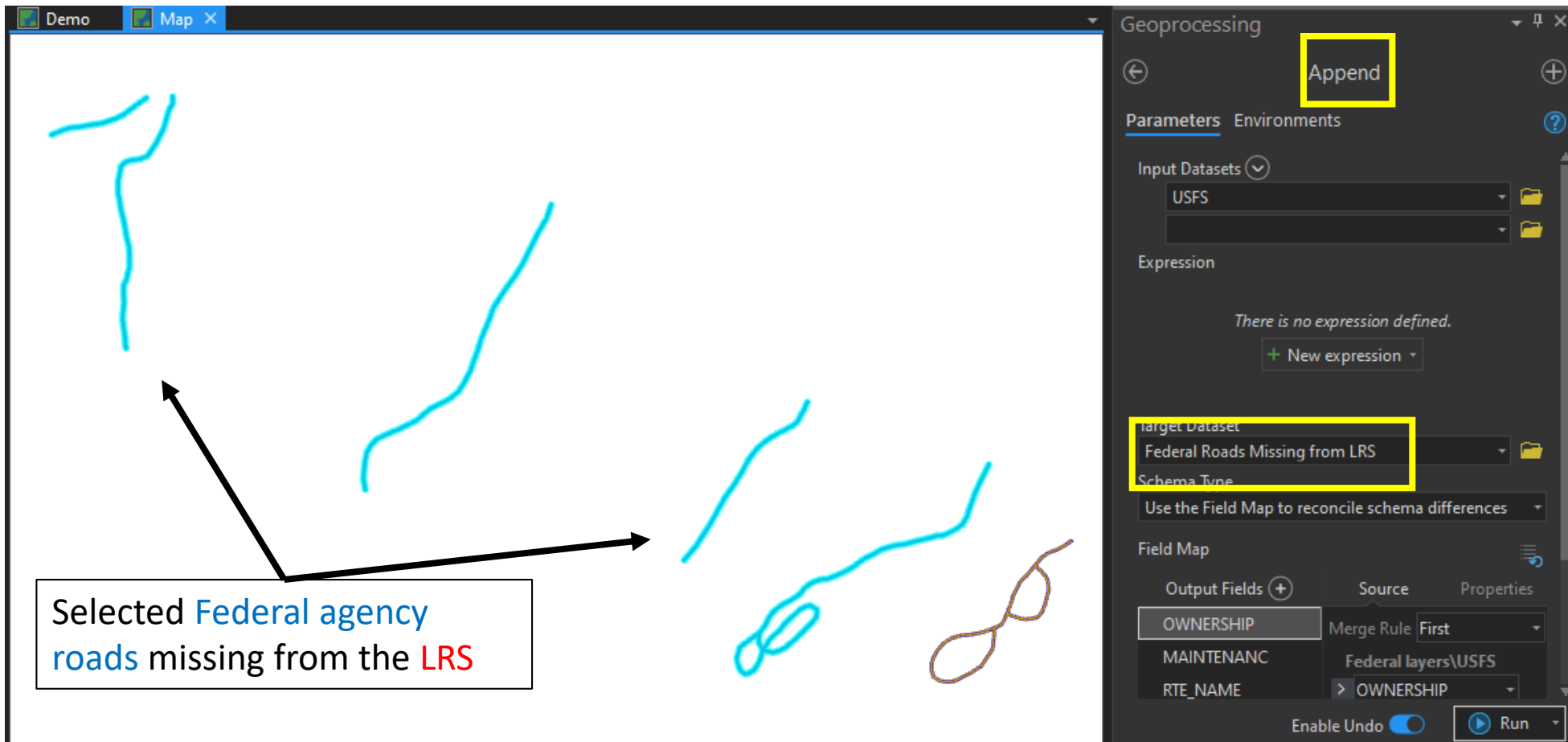
Attributes Geometry

EDIT_TMS	6/28/2018 3:12:57 PM
COMMENT_	PRIVATE
EDIT_USER	GIC_EDIT
GEOMETRY_Length	<Null>
Street name and suffix	21N51Y
Federal_ownership	Forest Service
Federal street name	21N51Y - CROSS UP
Shape_Length	1633.136521

☒ Auto Apply

Manual Editing 3 (append to missing)

Append any newly discovered Federally owned roads that are missing from the LRS to the **"Fed_MissingFrom_LRS"** layer



The screenshot displays the QGIS software interface. On the left, a map window titled 'Map' shows several blue line segments representing roads. A black arrow points from a text box to these segments. The text box contains the text: 'Selected Federal agency roads missing from the LRS'. On the right, the 'Geoprocessing' panel is open, showing the 'Append' tool. The 'Append' button is highlighted with a yellow box. Below it, the 'Parameters' tab is active. The 'Input Datasets' section shows a dropdown menu with 'USFS' selected. The 'Expression' section has a message 'There is no expression defined.' and a '+ New expression' button. The 'Target Dataset' section shows a dropdown menu with 'Federal Roads Missing from LRS' selected, which is also highlighted with a yellow box. The 'Schema Type' section has a dropdown menu with 'Use the Field Map to reconcile schema differences' selected. The 'Field Map' section shows a table with columns 'Output Fields', 'Source', and 'Properties'. The 'Output Fields' column lists 'OWNERSHIP', 'MAINTENANC', and 'RTE_NAME'. The 'Source' column shows 'Merge Rule' set to 'First'. The 'Properties' column shows 'Federal layers\USFS' and 'OWNERSHIP'. At the bottom of the panel, there is an 'Enable Undo' toggle switch and a 'Run' button.

Selected Federal agency roads missing from the LRS

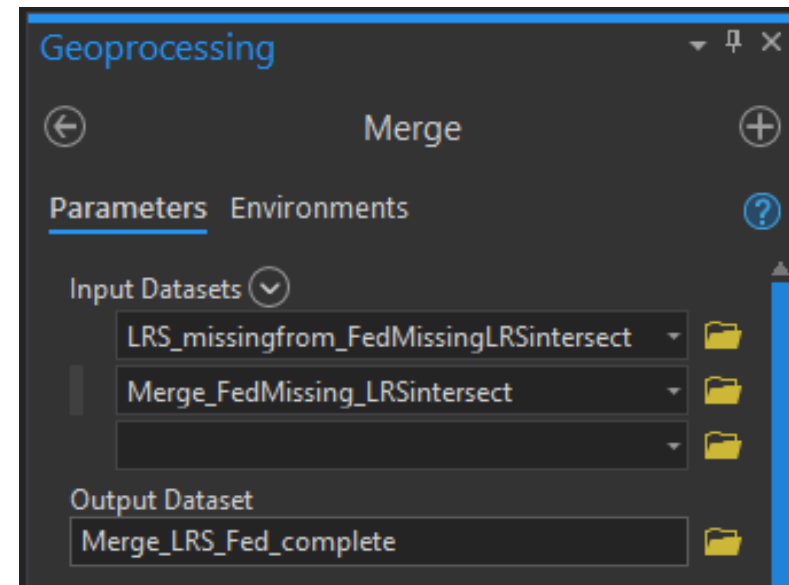
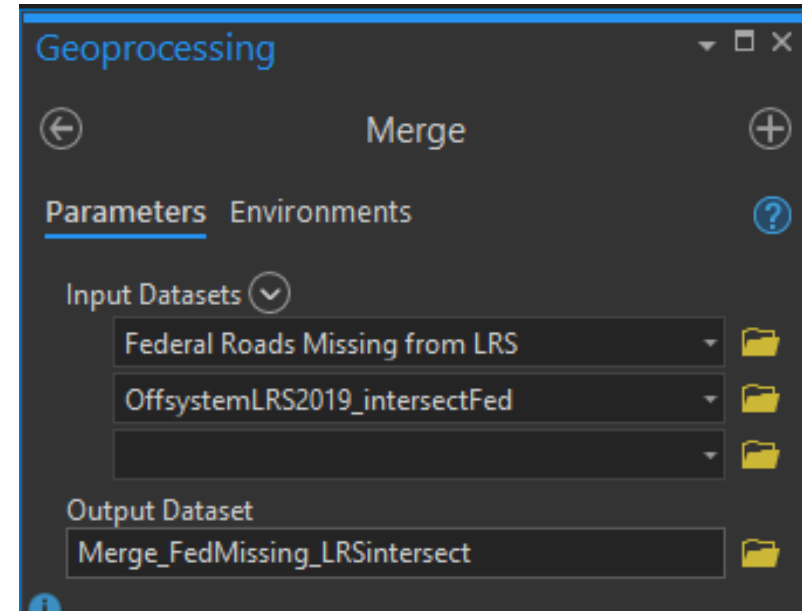
Append to
"Fed_MissingFrom_LRS"

Merge it All Together

After the manual editing process, Merge
“Fed_MissingFrom_LRS” to
“Fed_Intersect_LRS”

- Now the Federally owned roads that were missing from the LRS have been added to the “Fed_Intersect_LRS” dataset

Merge “Fed_Intersect_LRS” back into the full LRS



Final Mileage Comparison

Agency	Federal mileage	LRS mileage	Difference (Fed - LRS)
Bureau of Land Management	768.9454	785.2693	-16.3239
Bureau of Reclamation	469.2541	426.5941	42.66
National Park Service	862.5024	857.099	5.4034
US Fish and Wildlife Service	167.9095	167.449	0.4605
US Forest Service	8,095.2786	8,089.3243	5.9543
Total	10,363.89	10,325.7357	38.1543

99.63% of Federal roads
successfully incorporated

Lingering Issues...

- Methodology is very lengthy (3 months to incorporate 5 Federal agencies)
- Are all the Federally owned roads publicly accessible (belong in LRS)?
 - A public road is any road or street owned and maintained by a public authority and open to public travel. [23 U.S.C. 101(a)].
 - ... must be ... passable by four-wheel standard passenger cars, and open to the general public for use without restrictive gates, prohibitive signs, or regulation ... [23 CFR 460.2(c)]
- Roads with conflicting Federal ownership
 - 20 road segments, approx. 55 miles
- Accuracy of Federally owned roads compared to Local LRS

Questions?

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